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of

Rhonda Schrader
947, Franklin Ave
Winthrop Harbor, IL 60096
Citizen of the United States of America

for

ANIMAL WASTE CONTAINMENT SYSTEMS

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Inventor: RHONDA SCHRADER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. Serial No. 10/703,314 filed November 7, 2003, which is a continuation-in-part of U.S. Serial No. 10/634,688 filed August 4, 2003, which is a continuation of U.S. Serial No. 10/121,100 filed April 24, 2002, now U.S. Pat. No. 6,626,129 issued September 30, 2003, which claims priority to provisional application No. 60/286,106, filed April 24, 2001.

BACKGROUND

[0002] Maintaining birds or other pets or animals either in a residential or a commercial setting requires appropriate restraining and waste removal systems. Enclosures to restrain animals are typically made of wired or barred cages with floor bottoms. Some of these cages have grid floors to let the debris such as fecal matter, feathers, hair, bodily secretions, and left over food particles or other airborne particulates to pass through, while restraining one or more animals within the enclosures. Birds or other pets or animals can also be maintained on stands, perches or other support means that may or may not be surrounded by cages. To clean debris, newspaper liners, metallic pull-out trays, and other cleaning systems have been used.

SUMMARY

[0003] The present disclosure relates to a waste containment system that provides a filtration system to trap and filter particulate waste from an animal enclosure or from an animal support means such as, for example, stands, perches, ladders or any other suitable supports. The filtration system may be used, for example, with bird cages or any other enclosures for any other animals. The filtration system may also be used, for example, with animal support means such as, for example, stands, perches, ladders or any other suitable supports.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The drawings are provided to illustrate some of the embodiments of the disclosure. It is envisioned that alternate configurations of the embodiments of the

present disclosure maybe adopted without deviating from the disclosure as illustrated in these drawings.

[0005] FIG. 1 is a front elevational view of a waste containment system in accordance with an illustrated embodiment of the present disclosure, with an animal support means schematically illustrated in partial view.

[0006] FIG. 2 is a partial exploded and partial perspective view of the waste containment system of FIG. 1, illustrating a tubing, a tray, a hopper, and a filtration unit.

[0007] FIG. 3 is a partial perspective view of the waste containment system of FIG. 1 with various components removed to illustrate other components of the system.

DETAILED DESCRIPTION

[0008] While the concepts of the present disclosure are illustrated and described in detail in the drawings and the description below, such an illustration and description is to be considered as exemplary and not restrictive in character, it being understood that only the illustrative embodiment is shown and described and that all changes and modifications that come within the spirit of the disclosure are desired to be protected.

[0009] FIGS. 1-3 illustrate an embodiment of a waste containment system of the present disclosure comprising an animal support means **18** and a filtration system **12** associated with the an animal support means **18**. The filtration system **12** comprises a tray **14**, a hopper **16**, a base member **20** and a filtration unit **24**, each of which may have any suitable configuration and construction.

[00010] In the illustrated embodiment, the an animal support means **18** is a perch to allow birds or other animals or pets to rest, play or feed. The animal support means **18** may have any suitable configuration, construction, dimensions, and may support any suitable animal. An animal support means such as, for example, bird stands, perches, ladders, swings, suspended food cups, toys, or any other suitable supports may also be used instead of an animal enclosure or within the animal enclosure. The animal support means **18** may be removably secured above the filtration system **12** or removably suspended above the filtration system **12**. The animal support means **18** may be, for example, a perch to support birds. Other suitable animals that can be supported by or otherwise engaged with in the animal support means **18** include for example, rodents, mice, reptiles, lizards, turtles, rabbits, and snakes. The filtration system **12** may filter waste materials

such as, for example, fecal material, feathers, hair, dander, skin tissue, bodily secretions, and food material.

[00011] In the illustrated embodiment, the tray **14** has a floor **30**, three raised sides **32** and a fourth side with an edge **36** defining a void **38**. The tray **14** defines a cavity **28** for receiving a liquid **40**. The tray **14** is positioned below the animal support means **18**. The tray **14** or any other suitable receptacle is configured to permit passage of a liquid **40** and waste that falls from the animal support means **18**. The liquid **40,** with such waste materials, drains from the tray **14** into a hopper **16** associated with the tray **14**. The tray **14** slopes towards the edge **36** defining the void **38** to enable the liquid **40** to drain through the void **38** into the hopper **16**. The tray **14** may be of any other form of any suitable receptacle and the cavity **28** may have any suitable configuration in accordance with other embodiments. The slope of the tray **14** can be adjusted in any suitable manner, such as, for example, with adjustable screws attached to the bottom of the tray **14**. The tray **14** can also be designed to have a fixed slope capable of draining the liquid **40** towards edge **36**. The animal support means **18**, the tray **14**, and the hopper **16** can be made of any suitable material, such as, for example, metal or plastic.

[00012] In the illustrated embodiment, a tube **42** with caps **44** on both ends and a T-fitting **46** in the center of the tube **42**, is positioned on the side of the tray **14** that is opposite to the edge **36** through a notch **50**. The tube **42** may have any suitable configuration and construction and can be positioned in any suitable manner, such as, for example, removably secured to the tray **14** through the notch **50** using an adhesive such as, for example, rubber cement. The tube **42** can also be positioned on other sides of the tray **14**. The T-fitting **46** connects the tube **42** to a tubing **52**. The tube **42** has a plurality of openings **54** through which liquid **40** enters the tray **14** to permit continuous flow of liquid **40** in the tray **14**. The tube **42** may also have any form of openings **54** that permit passage of liquid **40** to the tray **14**. The tube **42**, the tubing **52**, and the T-fitting **46** are made of flexible plastic, but they can also be made of any suitable material such as, for example, metals, or any other suitable material that is compatible with the liquid **40** containing animal waste.

[00013] In the illustrated embodiment, the hopper **16** is associated with the tray **14** to permit draining of the liquid **40** with waste from tray **14**. The hopper **16** may have any

other suitable configuration and construction, such as, for example, comprising three raised sides **60**, a floor **62**, and an opening **64** to drain the liquid **40**. The hopper **16** may be associated with the tray **14** in any other suitable manner, such as, for example, positioned separately below the tray **14**. The hopper **16** is associated with the edge **36** of the tray **14**. The floor **62** of the hopper **16** slopes to enable the liquid **40** drain through the opening **64**.

[00014] In the illustrated embodiment, the filtration system **12** comprises a filtration unit **24**, a circulating pump **70**, a sterilizer **72**, and an auto-shut off float-switch **76**, each of which may have any suitable configuration and construction. The base member **20** is made of wood, and the filtration unit **24** is made of acrylic. The base member **20** has a hinged door **80** for easy access to a pullout shelf **82** on which the filtration unit **24** rests. The filtration unit **24** comprises a mesh basket **66**, which is a screen made of any suitable material such as, for example, metal. The mesh basket **66** may have any suitable configuration and construction and can be positioned in any suitable manner. The liquid **40** containing the waste exits the hopper **16** and enters the mesh basket **66**. The mesh basket **66** is positioned removably below the hopper **16** and is held by supports **68**. The mesh basket **66** is useful to trap and dispose large particulate debris such as, for example, seeds, hulls, and feathers. The liquid **40** passes through the mesh basket **66** and enters a coarse foam mat **84** positioned below the mesh basket **66**. The coarse foam mat **84** may have any suitable configuration and construction and may be made of any suitable material such as, for example, porous filter layer.

[00015] In the illustrated embodiment, the coarse foam mat **84** rests on a porous tray **88** held by supports **86**. The foam mat **84** can also be placed directly on top of fiberglass blocks **90**. The foam mat **84** is held on supports **86** that are positioned above the fiberglass blocks **90** with a gap. The liquid **40** from the mesh basket drains and passes through the foam mat **84**. The foam mat **84** may be any other form of a suitable porous filter layer. The foam mat **84** traps and holds fine particulate such as dander and granular waste. The foam mat **84** can be removed, rinsed, and replaced as necessary. The foam mat **84** is made of a porous filter layer such as, for example, a bonded filter pad that is capable of trapping particulate waste. The foam mat **84** or other similar filter material can be obtained from standard hardware stores or from filter manufacturers.

[00016] In the illustrated embodiment, the filtration unit **24** accommodates a plurality of fiberglass blocks **90** containing biological media positioned below the foam mat **84**. The fiberglass blocks **90** may have any suitable configuration and construction and may be positioned in any suitable manner within the filtration unit **24**. In the illustrated embodiment, the fiberglass blocks **90** are porous and contain biological media such as, for example, bacterial colonies. The biological media may include any suitable microbial population capable of degrading unwanted organic material in the liquid **40**. The biological media may also include any biological component such as, for example, enzymes that can degrade unwanted organic material in the liquid **40**. The fiberglass blocks **90** rest on a support **92**. In the illustrated embodiment, there is space between the foam mat **84** and the fiberglass blocks **90**. The support **92** can be raised so that the fiberglass blocks **90** rest directly below the foam mat **84** without any observable space. The fiberglass blocks **90** containing biological media with bacterial colonies can be obtained from standard pet stores or from other biological media manufacturers such as, for example, Coral Life (Carson, CA) and Kent Marine (Acworth, GA). The liquid **40** flows through the fiberglass blocks **90** and enters a carbon cartridge **94**. The fiberglass blocks **90** containing biological media may immersed in the liquid **40** within the filtration unit **24**. Other biological media such as Bio-Mate, Bio-Sponge Balls, Lee's Bio-Pin Balls and Bio-Chem Stars can be obtained from aquarium supply stores and ordered from aquarium supply catalogs such as, Doctors, Foster & Smith (www.DrsFosterSmith.com).

[00017] In the illustrated embodiment, the carbon cartridge **94** fits into a vertical slot **98** in the filtration unit **24** and contains activated carbon to remove odors to further purify the liquid **40**. The carbon cartridge **94** may be any carbon filter, may have any suitable configuration and construction, may contain any suitable material such as, for example, activated charcoal, and may be positioned in any suitable manner within the filtration unit **24**. The carbon cartridge **94** comprises a snap-open plastic cartridge filled with activated carbon. The carbon cartridge **94** may also be a canister filled with carbon such as, for example, hang-on type canisters filled activated carbon used in aquarium products. The carbon cartridge **94** is commercially available from manufacturers such as, for example, Supreme Biomatrix (Central Islip, NY) and Tetratec by Tetra (Blacksburg, VA). The carbon cartridge **94** or its contents, such as, for example, granular activated carbon, found

in pet stores featuring aquarium products, can be replaced as often as necessary. An additional independent hang-on canister style charcoal filter can also be used to increase the cleaning performance if necessary. A canister style filter such as, for example, Hot Magnum™ may be purchased from an aquarium products manufacturer such as, for example, Marineland (Moorpark, California) available in standard pet stores. The canister style filter may be hung outside the filtration unit **24**. The canister style filter may have its own pump to draw the liquid in for filtering.

[00018] In the illustrated embodiment, the filtration unit **24** may comprise the mesh basket **66**, the foam mat **84**, and the carbon cartridge **94**. The fiberglass blocks **90** with the biological media or any other biological media such as Bio-Mate and Bio-Sponge Balls need not be included in the filtration unit **24**.

[00019] In the illustrated embodiment, a tubing **52** connects a pump **70** to the T-fitting **46** in the tray **14**. The pump **70** permits circulation of the liquid **40** from the filtration unit **24** to the tray **14**. The pump **70** may have any suitable configuration and construction, and may be positioned in any suitable manner within the base member **20**. The pump **70** is within the liquid reservoir **96** and is connected to an electrical outlet **102**. The liquid reservoir **96** is part of the filtration unit **24** and accommodates the pump **70**. The pump **70** can also be positioned outside the reservoir **96**.

[00020] In the illustrated embodiment, the liquid reservoir **96** of the filtration unit **24**, has a controllable drain **100** to drain the liquid **40**, if necessary, without disturbing other components of the filtration unit **24**. The controllable drain **100** may have any suitable configuration and construction, and may be positioned in any suitable manner within the filtration unit **24**.

[00021] In the illustrated embodiment, the filtration system **12** is further configured to include a sterilizer unit **72** capable of eliminating unwanted microbial growth in the circulating liquid **40**. The sterilizer unit **72** may have any suitable configuration and construction, and may be positioned in any suitable manner within the base member **20**. An ultraviolet sterilizer unit **72** is connected posterior to the pump **70** and anterior to the tray **14** and is positioned outside the filtration unit **24**. The sterilizer unit **72** and is connected to the electrical outlet **102**. Other modes of sterilization such as, for example,

irradiation, chlorination, bromination, or application of antimicrobial agents can also be implemented.

[00022] In the illustrated embodiment, the filtration system **12** is configured to provide an auto-shut off float-switch **76** that controls the pump **70** when the liquid level falls below the fill line **104** in the reservoir **96**. The automatic shut-off float switch **76** may have any suitable configuration and construction, and may be positioned in any suitable manner within the liquid reservoir **96**. The automatic shut-off float switch **76** is positioned inside the reservoir **96** at a suitable height, such as, for example, at the fill-line **104**, and is connected to the electric outlet **102**. An automatic shut-off float-switch **76** can be obtained from a standard hardware store. Any other method of controlling the pump **70** can also be implemented. The liquid **40** refers to any substance capable of flowing freely, such as, for example water.

[00023] The filtration system **12** may have other suitable configurations such as, for example, a configuration that fits a large floor-model animal support means **18** that rests within a tray **14** on stainless steel supports. The tray **14** may have any suitable configuration, such as, for example, same size and shape as the area covered by animal support means **18** or of smaller or a larger size than animal support means **18**. The shape of the base member **20**, the hopper **16**, and the hopper's opening **64** may have any suitable shape, such as, for example, the hopper **16** may be conical and the hopper's opening **64** may be rectangular.

[00024] The mesh basket **66** may have any suitable configuration such as, for example, a flat, lift-out screen. The shape of the mesh basket **66** may have any suitable configuration such as, for example, rectangular, or conical. The mesh basket **66** can be placed directly on top of the foam mat **84** without any support or can be held from a support **86**. The mesh basket **66** may also be substituted by a flat permeable screen that traps large particulate matter such as seeds, hulls, and feathers. This screen may rest on top of the foam mat **84** or can rest within the hopper **16** and may have any suitable configuration and construction such as, for example, rectangular, circular, or cubical, cylindrical or spherical in shape. The screen may be made of any suitable material such as, for example, plastic, metallic or any other suitable liquid-compatible material.

[00025] The fiberglass blocks **90** with bacterial colonies may be substituted with other commercially available biological filter media such as, for example, Bio-Balls, manufactured by Coral Life, a subsidiary of Energy Savers Unlimited (Carson, CA).

[00026] The order of the mesh basket **66**, foam mat **84**, the fiberglass blocks **90**, and the carbon cartridge **94** may be suitably interchanged. For example, the carbon cartridge **94** may be placed directly above the fiberglass blocks **90**.

[00027] The pump **70** may have any suitable configuration. Operating requirements of the pump **70** depends on the amount of liquid **40** to be circulated, the speed with which the liquid **40** needs to be circulated, the noise level of the pump **70**, and also on the power consumed. The specifications of a suitable pump **70** can be determined by one of ordinary skill in the art and can be obtained from a standard pump manufacturer. The pump **70** can be positioned inside the liquid reservoir **96** or outside the liquid reservoir **96**. The pump **70** can also be positioned at a remote location from the liquid reservoir **96**.

[00028] The filtration system **12** can also be designed to fit animal support means **18** of smaller size, such as, for example, portable table-top animal support means **18**. The filtration system **12** can also be designed to fit individual support means or a series of support means positioned over the filtration system **12**. The size, shape, and the components of the tray **14**, hopper **16**, and the filtration unit **24** can be suitably modified to fit any other enclosure, such as, for example, a small table-top bird cage.

[00029] A filtration unit **24** for a small table-top portable bird cage may have any suitable configuration. The filtration unit **24** for a table-top bird cage may comprise, for example, a mesh basket **66**, foam mat **84**, and a carbon cartridge **94**. The liquid **40** can be replaced as necessary.

[00030] The filtration system **12** can also be configured to include a series of interconnected trays **14**, hoppers **16**, and mesh baskets **66** that trap and remove waste from multiple animal support means **18** positioned over the filtration system **12**. The liquid **40** with waste materials may drain into a common filtration unit **24** for filtering .

[00031] The filtration system **12** can also be configured to provide a large body of liquid **40** of sufficient dimensions to cover multiple animal support means **18** positioned separately, for example in a laboratory or in an aviary. Waste materials from multiple animal support means **18** positioned over the filtration system **12** will be trapped for

further filtering by the filtration unit **24**. Such configurations can be constructed for commercial or residential use to provide easy maintenance to filter waste from multiple animal support means **18**. The specifications of the tray **14**, filtration unit **24**, the pump **70**, the sterilizer **72**, and other components of the filtration system **12** can be appropriately configured to account for the increased volume of liquid **40** and the waste generated.

[00032] The filtration system **12** can also be configured to have a filtration unit **24** at a remote location from the animal support means **18** for example, in the back yard, in a separate room, or in the basement of a house. This may be achieved by connecting a tubing **52** to the hopper **16** and extending the tubing **52** to the distant location of the filtration unit **24**. The liquid **40** can be circulated from a distant location through a suitable pump **70**.

[00033] The filtration system **12** can also be configured to have the tray **14** designed in such a way that eliminates the use of a hopper **16**. For example, the edge **36** of the tray **14** can be designed such that the tray's **14** void **38** narrows as a funnel, which is capable of draining the liquid **40** directly into a filtration unit **24** without the hopper **16**.

[00034] The filtration system **12** can also be configured to have a commercial filtration unit. The commercial filtration units can be adapted to filter the liquid **40** with waste described herein. Such commercial filtration units may use a filtering mechanism that may be different from the one disclosed in the illustrated embodiment without deviating from the scope disclosed herein.

[00035] The filtration system **12** can also be configured to provide an optimal flow-speed for the liquid **40** in the tray **14**, such that sufficient time lapses for an animal handler to visually observe the condition of the excreta. Visual monitoring of the animal excreta such as bird droppings may be helpful in diagnosing illness. An optimal flow-speed for the liquid **40** can be set using a standard valve at the T-fitting **46** to regulate the flow of liquid **40**, by controlling output of the pump **70**, or by adjusting the slope of the tray **14** that contains the liquid **40**. The level of the liquid **40** flowing in the tray **14** can be suitably adjusted by modulating the flow-speed of the pump **70**, by adjusting the slope of the tray **14**, or by adjusting the opening **64** of the hopper **16**. The level and the speed of

flow of liquid **40** may depend upon the amount of waste generated, the filtering capacity of the filtration unit **24**, and the pumping capacity of the pump **70**.

[00036] The filtration system **12** can also be configured to provide a soothing sound of flowing liquid **40** to the animals in the support means **18** as well as to the animal handlers and pet owners. This may be achieved by adjusting the speed of the flow of the liquid **40** to create a comfortable and a soothing sound. In addition, the flow of the liquid **40** in the tray **14** can be modified, such as, for example, through a bed of pebbles or rocks to create natural sounds.

[00037] The filtration system **12** can also be configured to have the animal support means **18**, the tray **14**, and the hopper **16** made of durable stainless steel to minimize wear and tear and also to reduce microbial contamination by having a non-porous surface. The stainless steel components may have round edges to reduce injury to animals and animal handlers. The components of the filtration system **12** and the animal support means **18** can also be made of other suitable materials such as, for example, plastic, metallic alloys, aluminum, composite fibers, or any other suitable material that is compatible with liquid **40** containing waste.

[00038] The filtration system **12** can also be configured to provide humidity to animals in the animal support means **18**. This may be achieved by the continuous movement of the liquid **40** such as, for example, water. Increase in humidity may be beneficial to certain caged animals, for example, birds in bird cages or in the animal support means **18**.

[00039] The filtration system **12** can also be configured to provide fragrance to the circulating liquid **40** for an aromatherapy. This may be achieved by adding chemicals or extracts or any other formulations to the liquid **40**, which release desired fragrance to the environment. These chemicals or extracts or any other formulations can also be used to mask any odor arising from the waste containment system and can be supplemented as necessary.

[00040] One way of operating the filtration system **12** is to position an animal support means **18** for waste removal, above a tray **14**. A filtration unit **24** is filled with a liquid **40** to a fill line **104**. In the illustrated embodiment, the liquid **40** is water. A pump **70** and a UV sterilizer **72** are connected in series as shown in FIGS. 1-3. A tubing **52** connects the pump **70** and the UV sterilizer **72** to the tray **14**. A tube **42** is connected to a T-fitting

46 at the center, which is connected to a tubing **52**. When the pump **70**, positioned within a base member **20**, is turned on, the liquid **40** is delivered through a plurality of openings **54** in the tube **42**, to form a body of liquid **40** that flows continuously across the tray **14**. The flowing liquid **40** traps and gradually removes waste and other airborne particulate that descend from the animal support means **18**. The waste-filled liquid **40** drains through an edge **36** of the tray **14** into a hopper **16**. For large particulate waste such as, for example, large food particles or other large waste particles, a brush or any other similar device may be used to move the waste towards the hopper **16**. A base member **20** accommodates a mesh basket **66**, a filtration unit **24**, a pump **70**, and a sterilizer **72**. The hopper **16** channels the liquid **40** into the mesh basket **66**. The mesh basket **66** rests on top of a foam mat **84**. The mesh basket **66** can be removed and cleaned daily to dispose debris such as seeds, feathers, and hulls. The liquid **40** with any finer particulate continues to flow through the foam mat **84**.

[00041] The foam mat **84** is useful to trap and hold the finer particulate such as dander and granular waste. The liquid **40** then flows into a plurality of fiberglass blocks **90** with bacterial colonies capable of decontaminating the liquid **40**. The fiberglass blocks **90** rest on a support **92**. A carbon cartridge **94**, a circulating pump **70** and the reservoir **96** are also part of the filtration unit **24**. The liquid **40** from the fiberglass blocks **90** enters the carbon cartridge **94**. The carbon cartridge **94** removes odors and purifies the water collected in the reservoir **96**. The pump **70** is connected to a sterilizer unit **72**, which is connected to the T-fitting **46** within the tube **42** by a tubing **52**. Filtered liquid **40** is circulated to the tray **14** to continue the filtering process described above. The liquid **40** is recycled as a filtering medium by the filtration unit **24**.

[00042] In the illustrated embodiment, the following steps may be practiced for periodic maintenance of the filtration system on a daily basis or as necessary:

(a) Move any large particulate waste on the tray **14** towards the hopper **16** with a brush or any other similar device

(b) The pump **70** is turned off

(c) The mesh basket **66** is removed and the accumulated waste is disposed

(d) The mesh basket **66** is replaced

(e) The fill line **104** is checked and the required amount of liquid **40** is

replenished if necessary

(f) The pump **70** is turned on.

[00043] The following steps may be performed on a weekly basis or as needed:

(a) The pump **70** is turned off

(b) The coarse foam mat **84** is removed, rinsed and replaced

(c) The carbon cartridge **94** is removed, rinsed and replaced

(d) The pump **70** is turned on.

[00044] Additionally, if needed, the reservoir **96** can be drained using a controllable drain **100**, without disturbing or removing other components of the filtration unit **24**. The reservoir **96** may be replenished with fresh liquid **40**.

[00045] There is a plurality of advantages that may be inferred from the present disclosure arising from the various features of the apparatus, systems, and methods described herein. It will be noted that other embodiments of each of the apparatus, systems, and methods of the present disclosure may not include all of the features described yet still benefit from at least some of the inferred advantages of such features. Those of ordinary skill in the art may readily devise their own implementations of an apparatus, system, and method that incorporate one or more of the features of the present disclosure and fall within the spirit and scope of the disclosure.